How to use threshold loss correction tables?

G. I. Veres/Budapest

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1 Tables

The correction tables can be found here:

$$/afs/cern.ch/user/v/veres/public/pp/analysis/y/bin/$$

in the following files:
$VTPC-12.table$ for Vertex-1, sectors 1 and 4.
$VTPC-14.table$ for Vertex-1, sectors 2,3,5,6
$VTPC-2.table$ for Vertex-2
$MTPC-SR.table$ for Main TPC, Stardard Resolution sectors
$MTPC-HR.table$ for Main TPC, High Resolution sectors.

We use two angle variables to describe the angle of the actual track at the actual cluster: Θ, the inclination between the neutral beam direction and the track direction, and Φ, the azimuthal angle (Fig. 1). In the tables, we use $tan(\Theta)$ and Φ bins (Φ in degrees). $\Phi = 0$ in the horizontal plane to the right, then $\Phi = 0$ increases counterclockwise looking downstream.

Because of the symmetry of the problem (mirror symmety to the vertical and horizontal axes), a $0 < \Phi < 90$ degrees interval is enough to take.
These are ASCII files, and they look like this: first line: a single integer N, giving the number of bins in $tan(\Theta)$. Then N lines for each Φ bin. In each line the following numbers are given:

$$tan(\Theta), \Phi(degrees), a, b, c, d$$

where the a,b,c,d constants are the necessary parameters for the correction. Some oxigen attachment is already included in these parameters, but there

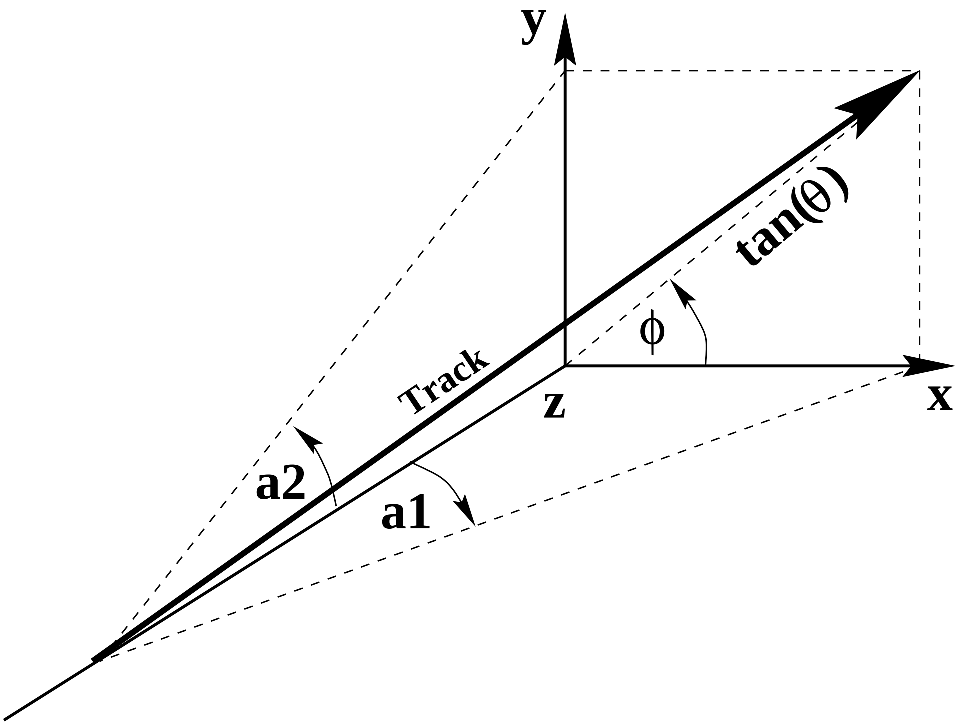

Figure 1: Definiton of the angles

is a possibility to check, whether an extra (small) ad-hoc drift dependence is needed or not. These fine-tuning parameters can be put into a file, for example

$$oxigen.table$$

in the mentioned directory. In this file, in each line there is an absolute sector number (1..6 for VTPC1, 7..12 fot VTPC2, 13..37 for MTPCL, 38..62 for MTPCR), and the corresponding extra "oxigen" content, given in percent/meter. This can be changed as needed, for each production/chunk of data. This should then be added to the "a" parameter, which is "universal" by definition over all the runs:

$$a = a + oxigen(for.the.given.sector)/100.$$

2 Correction

The way to correct the charges is the following: first, calculate difference between track and pad angle in "right" way (see my note why):
If $a1$ was the horizontal, $a2$ the vertical track angle, and t the pad tilt (with the same sign convention as $a1$), all of them with respect to the neutral beamline, we should redefine a1:

$$a1 = atan(abs(tan(a1) - tan(t)))$$

We should use a horizontal reference plane, which is defined by the equation $y = ref$, where $ref = 50 \quad cm$ for the Main TPC-s and $ref = 25 \quad cm$ for the Vertex TPC-s.

Then let Q' be the following quantity:

$$Q' = (d+b*ref/100.+(1.+a*ref/100.)*(Q-b*y/100.)/(1+a*y/100.))/(1.-c)$$

where y is the actual y coordinate of the cluster, Q is the measured cluster charge *in ADC-s*, before any corrections except baseline movement correction, finally a,b,c,d parameters are taken from the tables for the given sector type, and track angles (a is modified, see above).

Then, Q' will be the corrected charge. All the usual corrections can come after this step.

I never used baseline movements in p+p, but in case there is an effective baseline for the cluster available, let's say -1.23 instead of 0.00, then we can say that the effective threshold is 6.23 instead of 5.00, and the baseline is 0.00, and apply the same table, in a bit modified way. (Of course, the 1.23 times the area of the cluster should be added, the tables account for the tails only, as you know). Generally, the same procedure can be applied, if this effective threshold is T; let's introduce x:

$$x = T/5$$

then, if we think about Q' as a function of Q total charge and T threshold, one finds simply:

$$Q'[Q,T] = Q'[Q/x,5]/(Q/x) * Q$$

where the right side is known. This way I believe one can proceed if there is a baseline movement.

I agree that the above procedure can seem to be magic, however this is the way how one can correct for the threshold loss using my tables.